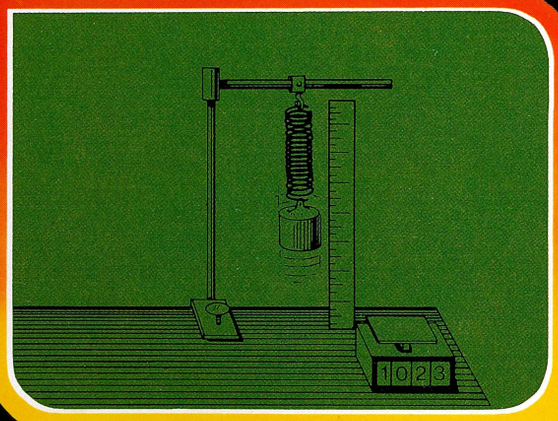
Educational Software for Students in Science and Engineering for the APPLE II, II+, and IIe

# UNPRINTABLE Physics

Sheridan Simon



$$F = ma = -kx - bv$$
$$\frac{d^2x}{dt^2} + \frac{b}{m}\frac{dx}{dt} + \frac{k}{m}x = 0$$
$$x = e^{-(b/2m)t}$$
$$\times (x_1 \cos\sqrt{k/m - b^2/4m^2}\,t + x_2 \sin\sqrt{k/m - b^2/4m^2}\,t)$$

**32**

**Simulations,**
**Demonstrations,**
**Examples & Quizzes,**
**as they**
**cannot be done in books**

PACKAGE CONTAINS:
1 48K Disk (Apple DOS)
1 User's Manual

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**Programs**

MATHEMATICAL METHODS

**Vectors** Shows the components and sums of any vectors you wish
**Graph** Displays any function in physics and allows evaluation at any point
**Least Squares Fit** Fits a line to any set of data points you input
* **Definite Integral** Evaluates any function in physics over any finite interval
* **Numeric/Analytic** Compares two solutions of equations of motion graphically

MECHANICS

**Trajectory Inquisition** Millions of quiz questions to test your knowledge
**Expedition to Io** The most unfair, brutal trajectory tests of all time
**One-D Motion** Shows position and speed versus time for nearly any force law
**Viscous Motion** Settling of particles in a stream under many conditions
**Collision** Simultaneous display of lab and CM frames with conditions input
**Multi-State Rocket** Simulates flights of launch vehicles of your own design
**Damped Harmonic Demo** Displays oscillations with wide choice of inputs
**Two-D Harmonic Motion** Shows circular, elliptical, and Lissajous motion
**Moment of Inertia** Calculates this for any set of lines, points, and rings
**Kepler's Laws** Displays all three laws for your choice of planetary orbits

THERMODYNAMICS

* **Maxwell–Boltzmann Distribution** Molecular speeds at any desired temperature
**P-V Graphs** Shows change in state of any desired gas for many situations
**Thermodynamic Changes** Millions of challenging timed quizzes
* **Thermodynamic Cycles** Design your own four-step heat engine
**Molecular Motion** Shows motion of gas molecules for many input conditions

ELECTROMAGNETISM

**Electric Field** Field lines of sets of charges at any points you choose
**Cathode Ray Tube** Displays electron motion for any system you design
**Uniform *B* Field** Shows motion of electron for any magnetic field conditions
* **LRC Circuits** Simulates voltage across any element of a circuit you design
**Electrical Generator** Displays voltage output of a generator of your own design

WAVE PHENOMENA

**Waves** Displays a wave of any desired amplitude, frequency, and phase
**Superposition** Addition of waves specified by your own inputs
**Snell's Law** Refraction of light at the interface between any two media
**Thin Lens** Scale diagram of objects and images for any simple lens

MODERN PHYSICS

**Radioactivity** Simulated experiments of radioactive dating
**Special Relativity** Displays time dilation for any relative speed
**Hydrogen Spectrum** Line produced by any transition plus Doppler shift

*Please note: The educational value of these programs will be enhanced by a knowledge of basic calculus. However, only those programs marked with an asterisk require calculus.

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